

NON-PUBLIC?: N  
ACCESSION #: 9001310373  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Kewaunee Nuclear Plant PAGE: 1 O  
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DOCKET NUMBER: 05000305

TITLE: Closure of the Turbine Stop Valves Causes a Turbine/Reactor Trip  
EVENT DATE: 12/27/89 LER #: 89-016-00 REPORT DATE: 01/26/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Jeffrey W. Bergmann - Plant Nuclear Engineer

TELEPHONE: (414)338-2560

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: JB COMPONENT: LT MANUFACTURER: F180  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

At 1658 CST on December 27, 1989, with the reactor at 100% power, the plant experienced a turbine/reactor trip. The reactor trip was caused by both turbine stop valves closing coincident with the plant power level greater than 10%.

The turbine stop valves closed as a result of a decrease in electro-hydraulic (EH) trip fluid header pressure. The decrease in EH pressure could be caused by either of two valves opening in response to signals allowing the EH fluid to be dumped.

The root cause of the decrease in EH trip fluid header pressure could not be determined. A multi-disciplined committee was formed to review the event using formal root cause analysis techniques. Based on the review

of all applicable plant parameter data, the team generated several possible scenarios that may have occurred. A specific scenario which was the initiating event could not be conclusively determined. The report generated by the committee included several recommendations for follow-up inspections and maintenance during the next refueling outage (scheduled for March of 1990).

The plant was stabilized in the hot shutdown condition. As expected, the auxiliary feedwater pumps started, which is an ESF actuation, in response to the trip. This event is being reported as required by 10 CFR 50.73(a)(2)(iv).

END OF ABSTRACT

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#### Description of Event

At 1658 CST on December 27, 1989, with the reactor at 100% power, the plant experienced a turbine TRB!/reactor RCT! trip. The reactor trip was caused by both turbine stop valves closing coincident with the plant power level greater than 10%. As expected, the auxiliary feedwater pumps started, which is an ESF actuation, in response to the trip. There were no significant plant evolutions in progress at the time of the trip.

During normal operation the turbine stop valves, which are swing disc type valves, are kept 100% open toward steam flow by pressurized electro-hydraulic (EH) fluid. The EH fluid system supplies high pressure hydraulic fluid to position the turbine control valves, and initiates an abrupt closure of the control and stop valves upon receiving a trip signal. A decrease in EH trip fluid pressure below a nominal value of 1000 psig will cause the stop valves to close. The stop valves will close rapidly due to assistance from both steam flow and an internal closing spring. This decrease in EH pressure could be caused by the opening of either the interface valve or the emergency trip solenoid valve (20/ET) (Reference Figure 1).

The interface valve has spring-loaded diaphragm which is held closed against spring force by the auto stop oil. The auto stop oil system allows turbine latching. In addition, the auto stop oil system dumps oil pressure to provide turbine and reactor protection by quickly tripping the turbine and closing the turbine stop valves, thus stopping steam flow to the turbine. With the interface valve closed, the EH fluid system can be pressurized to hold the stop valves open. The interface valve opens when auto stop oil pressure is insufficient to overcome the spring tension. The opening of the interface valve results in the dumping of EH

fluid to drain, which causes the stop valves to close.

The emergency trip solenoid valve (20/ET) is connected directly to the EH fluid system. It opens in response to various plant inputs (for example - steam generator hi-hi level). The opening of 20/ET causes a dumping of EH fluid to drain, which closes the stop valves.

The root cause for the closure of the stop valves during this event could not be conclusively determined. Both turbine stop valves closing coincident with the plant power level greater than 10% caused a reactor trip. A solenoid valve (20-1/AST) energizes after a reactor trip, dumping auto stop oil to drain. The auto stop oil pressure will decrease, and at a nominal value of 45 psig pressure switches actuate and send signals to lockout the generator, dump EH fluid, and trip the reactor.

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The operators performed the recovery actions specified in Emergency Operating Procedure E-O, "Reactor Trip or Safety Injection", and stabilized the plant in the hot shutdown condition. A post trip review was performed to determine the trip initiating signal and safety significance of the trip.

Two equipment problems were identified after the event. One of the two main feedwater regulation valves was noted as indicating 10% open. In addition, the Operations and Shift Technical Advisor review of the post trip trends discovered that Steam Generator A narrow range level channel (LC-461) indication went high to about 75% indicated level and within minutes decreased to 0%. The two remaining S/G 1A level channels went immediately to 0% after the trip. Upon refill of the steam generator to within the narrow range span, all three S/G A channels were tracking together. The reactor protection bistables associated with S/G A level channel LC-461 were placed in the tripped position.

An exhaustive evaluation to determine the cause of the stop valve closure was immediately initiated. Although the root cause of the valve closure could not be conclusively determined it was concluded that no safety issues were present. A plant restart was authorized by the plant manager for 0630 on 12/28/89.

#### Cause of Event

The root cause of the stop valve closure could not be conclusively determined. A detailed multi-disciplined committee was formed to review the event using formal root cause analysis techniques. The

investigation included the development of fault trees and the assimilation of an event and causal factor time line. The committee consisted of personnel from various disciplines including Instrument and Control, Operations, Corporate Licensing, Technical Support, and the Turbine Vendor. Based on the review of all applicable plant parameter data, the team generated several possible scenarios that may have occurred. A specific scenario which was the initiating event could not be conclusively determined, however, the scenarios that were developed generated several recommendations for follow up inspections and maintenance during the upcoming refueling outage. These recommendations have been presented to WPSC management.

#### Analysis of Event,

This event is being reported under 10 CFR 50.73 (a)(2)(iv) as an event that resulted in an automatic actuation of the reactor protection system (reactor trip). The plant was kept in a stable condition and the health and safety of the public was not compromised.

After the trip various plant groups investigated the following functions:

1. Pressure Switch 16041 - A pressure switch in the auto stop oil system which activates at 45 psig. This activation causes 20/ET to energize to dump EH fluid. The pressure switch was tested and found to be working properly.
2. The interface valve was checked and found to be working properly.
3. 20/ET was verified to energize when required.
4. The EH and auto stop oil system were checked for leakage. There was no excessive leakage found in either system.
5. The turbine was latched indicating the EH and auto stop oil systems were operating properly.

The Instrument and Control Group investigated the problem with the main feedwater regulation valve position indication and found the valve closed. This problem was identified in the event notification for this Licensee Event Report. The locking screws holding the anti-rotation block on the stem had become loose which allowed the stem to rotate two complete turns in the closing direction. This resulted in only about a two inch stroke. A normal stroke is two and a quarter inches. The stroke was readjusted and the valve indication accurately reflected the closed condition.

LC-461 is the only controlling channel for the A Steam Generator water

level (SGWL) and provides one of the three protection channel inputs for SGWL. WPSC has concluded that the most likely cause for the erratic response is that the upper tap for level transmitter (LT-461) was partially blocked. This would result in LC-461 indicating an increased level initially following the trip as steam generator pressure increases. After the condensing pot pressure equalized with steam generator pressure, LC-461 would then track with the other channels. The calibration of the level transmitter was checked and no problem was found. Discussions were held to evaluate the possibility of disconnecting the line and attempting to clear the root valve, but it could not be done safely with the steam generator at 1000 psi. on the upstream side. The decision was made to place the protection bistables associated with LC-461 in A tripped condition leaving LC-461 in a conservative condition.

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#### Corrective Actions

The scenarios and associated recommendations have been presented to WPSC management for their information. These recommendations include follow up inspections and maintenance during the next refueling outage.

#### Additional Information

Similar Events - None.

Equipment Failure - None, that could be specifically identified.

Figure 1 "Turbine Fluid System And Auto Stop Oil System" omitted.

ATTACHMENT 1 TO 9001310373 PAGE 1 OF 1

WPSC (1414) 433-1598 NRC-90-9  
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January 26, 1990 10 CFR 50.73

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Gentlemen:

Docket 50-305  
Operating License DPR-43  
Kewaunee Nuclear Power Plant  
Reportable Occurrence 89-016-00

The attached Licensee Event Report for reportable occurrence 89-016-00 is being submitted in accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System."

Sincerely,

K. H. Evers  
Manager-Nuclear Power

PMF/jms

Attach.

cc - INPO Records Center  
Mr. Patrick Castleman,  
US NRC, Region III

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